

REMARKS

Claim 1 has been amended to include the recitations of claim 2, which has been canceled.

The dependency of claim 3 has been amended.

Claim 9 has been amended. Support for this amendment can be found in claim 4.

Upon entry of the Amendment, claims 1 and 3-24 will be pending.

With respect to the election of species requirement, Applicants confirm the Examiner's understanding that the additional repeating unit of Polymer Compound 3 is a unit of formula (4) wherein Ar₁₂ is a divalent heterocyclic group. Additionally, Applicants confirm that Polymer 3 is a polymer comprising a repeating unit of formula (1) in which Ar₃ is an arylene group.

The Examiner requests cooperation in correcting any errors in the specification.

Applicants have reviewed and revised the specification in an effort to correct any errors that may be present therein. Applicants submit a substitute specification herewith (a marked up copy so the Examiner may readily see the changes and a clean copy) and respectfully request that the substitute specification replace the specification of record.

The Examiner has objected to the specification for the following informalities:

The Examiner asserts that the paragraph bridging pages 38 and 39 are inconsistent with the Table 1 data for phenyl as the aryl group.

The Examiner asserts that all occurrences of "5" should be "6" and all the occurrences of "6" should be "5."

Applicants confirm the Examiner's assertion regarding the inconsistency of the paragraph bridging pages 38 and 39 and the data in Table 1. In the interest of clarification, Applicants have amended this paragraph in accordance with the Examiner's suggestion.

In view of the foregoing, Applicants respectfully request that the Examiner reconsider and withdraw the objection.

Claims 2, 3, 7, 8 and 9 have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite.

With respect to claims 2, 3, 7 and 8, the Examiner asserts that it is not clear if "one of the highest" means "the highest" and it is not clear if the results of the calculations will be the same regardless of which one of the highest occupied molecular orbitals is selected.

Applicants submit that when a molecule has a high symmetry, the molecular orbitals are degenerated and sometimes a plurality of HOMO (highest occupied molecular orbital) may be obtained. When molecular orbitals are degenerated, a plurality of HOMOs having very little energy differences are obtained as a result of the calculation, but the selection order of the carbon atoms having large sum square values defined in condition (C) of claim 2 is not changed in the arbitrarily selected HOMO. Accordingly, Applicants submit that there is no ambiguity in the calculation.

With respect to claim 9, the Examiner asserts that claim 9 does not recite formula (3).

Claim 9 has been amended to recite formula (3), which also appears in claim 4.

In view of the foregoing, Applicants submit that the claims are clear and definite. Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 1, 3, 5-9, 11-13 and 15-21 have been rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Hsieh, U.S. Patent No. 5,879,821 ("Hsieh").

Claims 14 and 22-24 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hsieh, U.S. Patent No. 5,879,821 ("Hsieh").

Claim 2 is not included in the above rejections. Claim 1 has been amended to include the recitations of claim 2, which has been canceled. Accordingly, claim 1 as amended is not anticipated or rendered obvious based on Hsieh.

Additionally, the polymer compound of the present invention comprises at least one repeating unit selected from the group of repeating units shown by formula (1) or formula (2) as defined in claim 1. The polymer compound comprises a repeating unit containing nitrogen atoms in the main chain, and specific aryl group (A) or heterocyclic group (B) branching from N. The light-emitting device using the polymer has improved lifetime and exhibits good characteristics.

The examiner states (page 5, lines 3-7) that, for example, given Hsieh's disclosure at col. 6, lines 20-44, one of ordinary skill in the art at the time of the invention would have at once envisaged a polymer having a repeating unit of present invention wherein each of E_1 and E_3 represents an aryl group (specifically, a phenyl group) which has three substituents selected from an alkyl group, alkoxy group, or halogen.

In the polymer of the present claim 1, when E_1 and E_3 is an aryl group (A) having three substituents, the positions of the substituents are defined by molecular orbital calculations.

When the aryl group is a phenyl group, the substituents are attached on the 4-, 2- and 6- carbon atoms. This is clearly shown in Table 1 of the present specification.

On the contrary, in Hsieh' s aryl group the three substituents are attached on the 3- , 4- and 6- carbon atoms. Hsieh does not disclose or suggest the specific carbon position of the substituents of the present claim 1.

In view of the foregoing, Applicants submit that the claimed invention is not anticipated or rendered obvious by Hsieh. Reconsideration and withdrawal of each of the rejections are respectfully requested.

Claims 1-3, 5-9 and 11-24 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Kreuder et al., U.S. Patent No. 5,814,244 ("Kreuder").

The polymer compound of the present invention comprises at least one repeating unit selected from the group of repeating units shown by formula (1) or formula (2) as defined in claim 1. The polymer compound comprises a repeating unit containing nitrogen atoms in the main chain, and specific aryl group (A) or heterocyclic group (B) branching from N. The light-emitting device using the polymer has improved lifetime and exhibits good characteristics.

Kreuder discloses an electroluminescence material comprising one or more polymers represented by structural units of formula (I).

The Examiner asserts that Kreuder provides for polymers comprising a repeating unit of present formula (1) wherein $a = 0$ or 1 and $b = 0$. The Examiner asserts that a polymer according to Kreuder in which Ar_2 and Ar_4 , if present, represent a group of the first formula at col. 25-31 is a polymer comprising a repeating unit of present formula (1) in which E_3 and E_1 , if present,

represents heterocyclic group (B) as defined in present claim 1. The Examiner further asserts that a polymer according to Kreuder in which Ar₂ and Ar₄, if present, represents a group of the second formula at col. 25-31 is a polymer comprising a repeating unit of present formula (1) in which E₃ and E₁, if present, represents aryl group (A) as defined in present claim 1 and further defined in claims 2 and 3.

In the polymer of the present claim 1, when E₁ and E₃ is an aryl group (A) having three substituents, the positions of the substituents are defined by molecular orbital calculations. For example, when the aryl group is a phenyl group, the substituents are attached on the 4-, 2- and 6-carbon atoms. Other examples of particular aryl groups and the order of priority of the carbon atom having substituents is shown in Table 1 in the specification.

Applicants submit that Kreuder does not disclose or suggest any of substituents defined in claim 1 of the invention.

The Examiner admits that Kreuder does not disclose a specific example of a polymer within the scope of the present claims. However, the Examiner asserts that it would have been obvious to one of ordinary skill in the art at the time of the invention to make other compounds within the scope of Kreuder's generic formula (I).

Applicants respectfully disagree. Applicants submit that Kreuder discloses a general formula (I) and a number of possible groups, which are unsubstituted and substituted, and combination of groups that may be present. Thus, there is no suggestion in Kreuder to select the particular combination of variables to produce a polymer compound as recited in Applicant's claimed invention.

In view of the foregoing, Applicants submit that the present invention would not be obvious based on Kreuder. Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 1-10, 12, 13 and 15-24 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Yamamoto et al., U.S. Patent No. 6,034,206 ("Yamamoto").

Yamamoto teaches a polyaryleneamine having a structural unit represented by general formula (1) (col. 1, line 55). Yamamoto further teaches that polyaryleneamines represented by formulas (3) or (7) are such that diphenylether or diphenyl sulfide residue and an aniline residue alternate in the polyaryleneamines having the structural unit represented by general formula (1) (col. 3, line 52 to col. 4, line 36). Yamamoto teaches that 2,4,6-trimethylaniline is an example of an aniline derivative (col. 4, line 30).

The relationship of "a" and "b" in Applicant's claim 1 has been amended to recite "a+b=0." As a result, the polyarylene amine of Yamamoto is not within amended claim 1.

In addition, as discussed above with respect to Hsieh and Kreuder, Yamamoto fails to disclose or suggest the specific carbon position of the substituents as recited in Applicants' claims.

In view of the foregoing, Applicant submit that the present invention would not be obvious based on Yamamoto. Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 1-24 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Woo et al., U.S. Patent No. 6,309,763 ("Woo").

Woo discloses a copolymer comprising groups of formula (I) and groups from formulas (II), (III), and (IV) (abstract). The subscript “b” in Woo’s repeating unit of formula (II) , (III) or (IV) may be 3. However, Woo does not teach a concrete example where $b=3$. Moreover, Woo does not teach the specific carbon position of the substituents as in Applicants’ claim 1.

In view of the foregoing, Applicants submit that the present invention would not be obvious based on Woo. Reconsideration and withdrawal of the rejection are respectfully requested.

The Examiner cites Towns et al., U.S. Publication No. 2001/0037012 (“Towns”) as prior art of record, but the Examiner has not relied on Towns in formulating a rejection.

Applicants submit that the relationship of “a” and “b” in Applicants’ claim 1 has been amended to recite “ $a+b=0$.” As a result, the polymer [0028] of Towns is not within the scope of Applicants’ claimed invention.

Additionally, as discussed above, Towns does not teach or suggest the specific carbon position of the substituents as recited in the present invention.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Makoto KITANO, *et al.*
Appln. No. 10/647,454
Amendment Under 37 C.F.R. § 1.111

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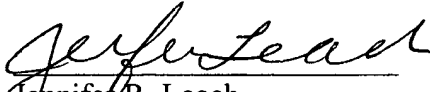
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